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Passport Data Based On Time Series Neural Network Prediction

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Abstract- Globalization has encouraged changes in people's lifestyles. The rapid flow of globalization between countries increasingly opens opportunities for each country to develop its economy. Level needs begin to shift, from secondary or tertiary needs into primary needs, such as a vacation or a trip, including travel abroad. The mobility of the population abroad for a holiday or business trip is also increasing, this will affect the busyness in the immigration office that has a very important role in terms of public services in the field of immigration.
The number of immigration visitors is fluctuating and unpredictable, when will there be spikes that cause problems and high risks. To maintain the credibility and quality of service, the immigration office needs calculations in forecasting the number of passport makers when there is a surge of visitors in order to remain able to provide optimal service to visitors.
This study uses the technique of forecasting Backpropagation Neural Network forecasting The superiority of Neural Network as a system is capable human thinking by computational intelligence-based computing in pattern recognition that is useful for modeling, predicting, detecting faults and controlling systems that require a design approach with computational artificial intelligence.

Keyword : *Passport, Neural Network Algorithm*

1. Introduction

The increasing trend and lifestyle and progress of society are increasing and economic progress has resulted in increasing population mobility abroad. The mobility of the population abroad for a holiday or business trip is also increasing, this will affect the busyness in the immigration office that has a very important role in terms of public services in the field of immigration. This can cause problems and high risks because the number of passport makers is very volatile so it can not be predicted when there will be a surge in the manufacture of passports . The number of applicants or passport makers will affect the lack of attention of officers in serving the community. (Geamaricha, 2015)

To maintain the quality of service required prediction calculation in forecasting the number of passport makers in order to avoid long queue and immigration office. Techniques used to maintain the quality of service in the manufacture of passports, reducing public dissatisfaction (customer relationship management) is Neural Network (El Zahery, 2014), and prediction techniques for solving passport forecasting cases are time series prediction using neural network (Neural Network (Nikolov, 2010) (Oencea, 2013). Neural Network is done to search or the process of finding something desired goal. The excellence of artificial neural networks as systems capable of mimicking human thinking by computational intelligence-based computing in pattern recognition can be

useful for modeling, predicting, detecting faults and controlling systems that require a design approach with computational artificial intelligence (Nguyen, 2014) , (Kusumodestoni, 2015).

2. Metodology

The data collected in the form of secondary data from the city immigration office of Semarang is the number of visitors immigration office Semarang for 24 months. Number of Visitor / Author of Passport of Semarang City Year 2014-2015. In the use of Neural Network in MATLAB use toolbox or code that is already provided by MATLAB. Processing using one type of feeding forward owned by ANN is backpropagasi.

1) Create a data variable
   Unutk can use the data owned then we need to create data variables recognized by MATLAB. In addition to using the above methods we can also manually enter our data into the variable editor available.
2) Divide data training and data testing
   Data training is the data used to perform pattern recognition that will be used to forecasting and time series. The training data gives the bias m weight, slope value, intercept value and correlation coefficient value. Data testing is a test data that will be used to calculate forecast and forecast error. In this study the data is divided into 70% data training and 30% data testing.
3) Normalize the data. For variables to be processed Neural Network then need to normalize the variable so that the variables are in the range [-1, 1]. Additionally peru converts the vector from variable to variabell line
4) Insert parameters and perform calculations
   In Neural Network there are several parameters that can affect the calculation result that is the number of iteration (epoch), the number of hidden neurons, the number of output neurons, the transfer function, the training function and the speed of learning.
5) Normalize the data.
   Data generated after going through the above process is still a normalization data. So it is necessary to normalize the data to provide a value that corresponds to the original value.

2.1. Proposed Method

At this stage the proposed method is Neural Network with Backpropagation. At this stage consists of:

a. Define the learning parameter
   Epoch Maksimum : 500
   Learning Rate : 0.05
   Error Tolerance : 0.011
   Training Function : 0.1
b. Define the activation function
   Sigmoid Bipolar Function The bipolar sigmoid function is used in the process of weighting the input node to a hidden range (-1.1). While in the output layer, the activation function used is the identity function.

2.2. Results and Discussion

Determination of the neural network parameters is done by finding the best value of the hidden neurons used. The following is the result of experiments that have been done for the determination of the number of neurons in the hidden layer.

Based on some experiments that have been done, the artificial neural network architecture optimized for the prediction of the timetable sequence of the passport is architecture 2-9-1. This architecture consists of 1 input layer with 2 neurons, 1 hidden layer with 9 neurons and 1 output layer with 1 neuron. The resulting MSE value is 0.0023 on Epoch 4 and the correlation coefficient value is 0.1068 The following is the result of network training using the default batch of the Backpropagation algorithm in Matlab:

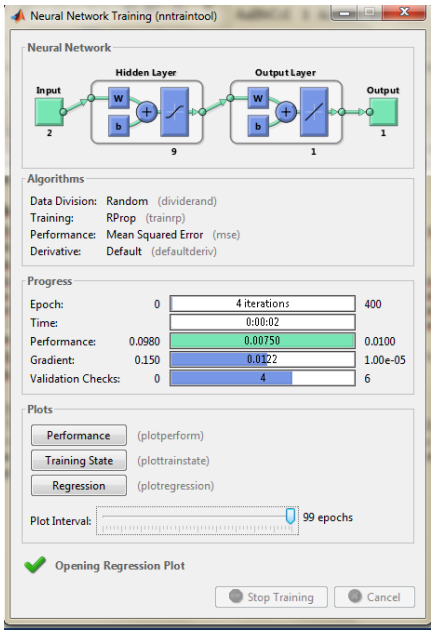


Figure 1. Neural Network Training

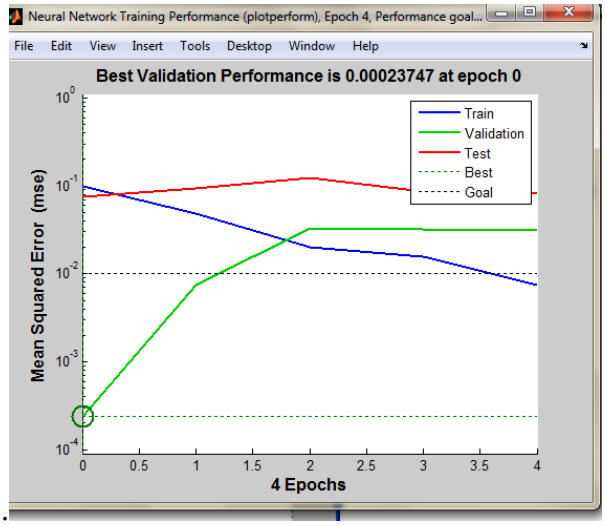
By using the default batch backpropagation algorithm, iteration is used 500 times with 2 seconds.

3. Evaluation and Validaton Result

Analysis of forecasting results with ANN based Backpropagation is done by comparing between forecasting results with actual target data so that the error value is obtained. The smaller the error value the better the forecasting value. From the above training process to produce a comparison between the target and the network output.. From the results of the training that has been done to produce evaluation charts, among others

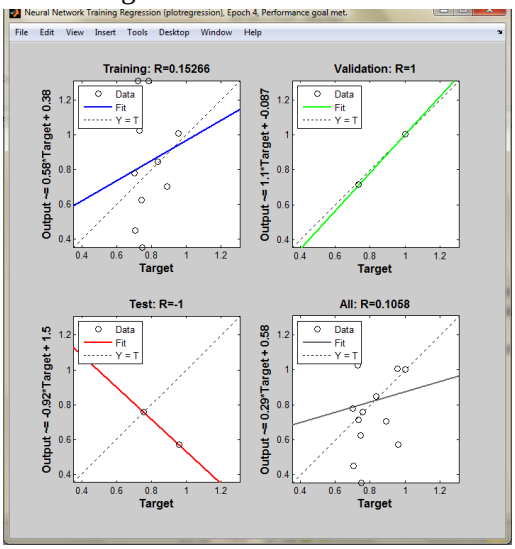
1). Performance

Performance is used to determine the calculation of errors that occur from the results of the comparison between the output network with the target output. The error calculation used is Mean Square Error (MSE) which is the mean of squares of difference between network output with output target of 0.012206 from error tolerance equal to 0.001 with maximum epoch 500.



2). Regression

Regression is used for evaluation by using correlation coefficient on network response and expected target. In Figure 4 obtained correlation coefficient value 0.1058. The correlation coefficient value of 0.1058 is already close to 1 indicating good result for matching network output with target.



4. Conclusion

Based on the experimental results, from the initial stage to the evaluation, it can be concluded that the prediction model of time duration of passport making using ANN method based on bacpropagatian is optimal and quite accurate is with 2-9-1 network architecture, ie 1 input layer with 2 neurons, 1 layer hidden with 9 neurons and 1 output layer with 1 neuron. Parameter used tansig activation function and trainer training function (Resilient Bacpropagation), with error tolerance 0,001, learning rate 0,05 and maximum epoch is 500. The value of MSE produced is 0.00023 and correlation coefficient value for training data is 0,15266 and correlation coefficient value for test data equal to 0,1056.

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